

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lopatin et al.

Title: METHOD OF USING TERNARY
COPPER ALLOY TO OBTAIN A LOW
RESISTANCE AND LARGE GRAIN
SIZE INTERCONNECT

Appl. No.: 09/994,395

Filing Date: 11/26/2001

Examiner: Ori Nadav

Art Unit: 2811

Confirmation No.: 7882

REPLY BRIEF

Mail Stop Appeal Brief -- Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Reply Brief is responsive to the Examiner's Answer dated March 27, 2008,
concerning the above-referenced patent application.

ARGUMENT

In Section 10 of the Examiner's Answer, the Examiner stated that Appellant does not argue that Edelstein et al. does not teach the method of "providing a copper alloy via material in the via aperture to form a via. The copper alloy material including Zinc (Zn) or Silver (Ag), and at least one element for increasing grain size including Calcium (Ca) or Chromium (Cr). In other words, Appellant argues that although Edelstein et al. teach the method of forming a device comprising a copper alloy element . . . said element is not used for increasing 'grain size.'" The Examiner's Answer mischaracterizes Appellant's argument.

Appellant's argument is that Edelstein et al. does not teach increasing grain size in a copper alloy via material by using a copper alloy fill material including calcium or chromium. This feature is clearly recited in each of the independent claims as set forth below.

Although Edelstein et al. teaches the use of chromium, it does not provide the chromium in the copper alloy material utilized to complete the copper via. Instead, the chromium is utilized in a copper seed layer. There is no indication that the use of chromium in the seed layer will provide for increased grain size in the copper alloy via fill material as required by the claims. Appellant notes that the Examiner appears to be misconstruing the deposition of copper alloy via material to form a via with the formation of copper seed layer. The copper seed layer is used to grow the via fill material in electric deposition process, it is not the fill material. See present application, page 7 paragraph 34.

Claim 1 recites "depositing a copper alloy via material in the via aperture to form a via." Depositing a seed layer does not form a via. Claim 10 recites "filling the via aperture with a ternary copper alloy via material to form a ternary copper alloy via." Claim 17 recites "filling the aperture with a ternary copper alloy via material to form a ternary copper alloy via." There are significant differences between growing a seed layer and filling the via aperture (Claims 10 and 17) (or depositing material in the via aperture to form a via (Claim 1)) as recited in the claims.

Further, claims 10 and 17 recite that the ternary copper alloy via electrically connects the first conductive layer and the second conductive layer. Such a connection would not be made by a seed layer, thereby further distinguishing the seed layer of Edelstein et al. from that of claims 10 and 17.

Without some indication that the seed layer would promote large grain sizes in the interconnect or via material, Edelstein et al. cannot show, describe or suggest the present invention as recited in the claims. Bogel et al. does not provide the teachings missing from Edelstein et al. as it does not mention via material. Accordingly, Appellants respectfully submit that the rejection of claims 1-3, 6, 10, 15, 17-20, and 22 under 35 U.S.C. § 102(e) should be withdrawn.

CONCLUSION

In view of the foregoing reasons and in addition to those presented in Appellant's Appeal Brief, Appellant submits that claims 1-3, 6, 10, 15, 17-20 and 22 are not properly rejected under 35 U.S.C. § 102(e) and are therefore patentable.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Please direct all correspondence to the undersigned attorney or agent at the address indicated below.

Respectfully submitted,

Date June 2, 2008

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